

## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 0000054987	FOR FURTHER ACTION		See item 4 below
International application No. PCT/EP2004/011530	International filing date (day/month/year) 14 October 2004 (14.10.2004)	Priority date (day/month/year) 21 October 2003 (21.10.2003)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant BASF Aktiengesellschaft			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

Date of issuance of this report  
27 July 2006 (27.07.2006)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  Ellen Moyse  e-mail: pi05@wipo.int
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## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year)	<b>See Form PCT/ISA/210 (sheet 2)</b>
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Applicant's or agent's file reference <b>0000054987</b>		FOR FURTHER ACTION See paragraph 2 below	
International application No. <b>PCT/EP2004/011530</b>	International filing date (day/month/year) <b>14.10.2004</b>	Priority date (day/month/year) <b>21.10.2003</b>	
International Patent Classification (IPC) or both national classification and IPC <b>C07C45/50, B01J31/24, C07C47/02</b>			
Applicant <b>BASF Aktiengesellschaft</b>			

## 1. This opinion contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the opinion
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

## 2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

## 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/EP	Authorized officer
Facsimile No.	Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/011530

## Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 

This opinion has been established on the basis of a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material
 

a sequence listing  
 table(s) related to the sequence listing
  - b. format of material
 

in written format  
 in computer readable form
  - c. time of filing/furnishing
 

contained in the international application as filed.  
 filed together with the international application in computer readable form.  
 furnished subsequently to this Authority for the purposes of search.
3.  In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/EP2004/011530

Box No. V	Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement																			
<p>1. Statement</p> <table> <tr> <td>Novelty (N)</td> <td>Claims 1-7</td> <td>YES</td> </tr> <tr> <td></td> <td>Claims _____</td> <td>NO</td> </tr> <tr> <td>Inventive step (IS)</td> <td>Claims 1-7</td> <td>YES</td> </tr> <tr> <td></td> <td>Claims _____</td> <td>NO</td> </tr> <tr> <td>Industrial applicability (IA)</td> <td>Claims 1-7</td> <td>YES</td> </tr> <tr> <td></td> <td>Claims _____</td> <td>NO</td> </tr> </table> <p>2. Citations and explanations:</p> <p>D1 = WO-A-02/068371</p> <p>1. The present invention relates to a process for the continuous preparation of aldehydes by hydroformylation of olefins.</p> <p>2. The document D1 cited on page 7, lines 19-28, is considered to be the closest prior art. It discloses a process for the continuous hydroformylation of olefinically unsaturated compounds by means of synthesis gas in the presence of complexed, homogenous rhodium catalysts, with the reaction being carried out in two successive reaction stages (see D1, claims 1, 7, 15, 18 and 20; page 4, lines 6-11). The total pressure in the first and second reaction stage extends over a range from 2 to 200 bar, and the CO/H<sub>2</sub> molar ratio is in each case in the range from 1:10 to 10:1 (cf. D1, page 9, line 29 - page 10, line 2 and page 18, lines 9-18). In the single working example of the process according to D1 (example 1), the second reaction stage is carried out at a higher pressure (25 bar) than that in the first stage (21 bar).</p> <p>3. Starting out from this prior art, the object of the present application can be considered to be discovery of an improved process for the hydroformylation of mixtures of internal and <math>\alpha</math>-olefins, which makes it possible to prepare aldehydes with relatively high n-selectivity from these mixtures.</p> <p>4. The process according to the present claim 1 differs from the known process in that the total pressure in the subsequent</p>			Novelty (N)	Claims 1-7	YES		Claims _____	NO	Inventive step (IS)	Claims 1-7	YES		Claims _____	NO	Industrial applicability (IA)	Claims 1-7	YES		Claims _____	NO
Novelty (N)	Claims 1-7	YES																		
	Claims _____	NO																		
Inventive step (IS)	Claims 1-7	YES																		
	Claims _____	NO																		
Industrial applicability (IA)	Claims 1-7	YES																		
	Claims _____	NO																		

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITYInternational application No:  
PCT/EP2004/011530

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

reaction zone is more than 1 bar lower than in the preceding reaction zone, with the CO partial pressure in the subsequent reaction zone likewise being lower. According to example 7 of the process of the invention, valeraldehyde having an n-selectivity of 96.1% (n/i ratio 96.1:3.9) is prepared from a 1-butene/2-butene mixture. This result is far superior to the n/i ratio achieved in D1 (67:33), especially since the butene mixture used in example 7 has a significantly higher proportion of 2-butene. The available prior art gives no suggestions which would have led a person skilled in the art to improve the n-selectivity of the previously described process by means of the alterations made according to the invention to the pressure ratios.

The subject matter of claim 1 therefore meets the requirements of PCT Article 33(2) and 33(3).

5. Claims 2-7 relate to particular embodiments of the invention according to claim 1. They therefore likewise meet the PCT requirements for novelty and inventive step.